

White Paper

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Name of Project Director: Lisa O'Sullivan

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To ensure the long term preservation of its collections, a library or archives cannot do better than to store them under proper environmental conditions. Maintaining the right temperature and relative humidity, with stable levels, will slow the natural deterioration of the physical materials that make up books, journals, manuscripts, photographs and other valuable cultural holdings. Providing protection from excessive light, ultraviolet light, air-borne particulate matter and pollution, and pests will also significantly extend the usable lifetime of collections. At The New York Academy of Medicine, we have been undertaking a decades-long effort to provide optimal conditions to our Library holdings, which rank nationally among the top half-dozen collections of rare and historical books and journals in the field of medicine. The “Old Stacks”—so named because they date from the construction of the building in 1925–1926—are the last major collections space that we need to address. Encompassing over nine floors of library stacks, with almost 40,000 linear feet of shelving, the Old Stacks hold extensive runs of over 20,000 medical journals from around the world from the 19th and 20th centuries, as well as medical books and reports.

In 2015 the Academy received a “Sustaining Cultural Heritage Collections” grant through the NEH Division of Preservation and Access. This grant has enabled us to take a major step towards the goal of providing proper environmental conditions in the Old Stacks. Achieving this goal in older buildings is a distinct challenge. In our case the heating system is radiator-based, and originally there was no air conditioning. Air movement is hard to control, with implications for appropriate heating, cooling, and separation of the space from outside conditions. The building is not amenable to quick, inexpensive solutions. With the aid of the NEH grant, we were able to secure the services of one of the nation’s most esteemed and knowledgeable consulting firms, the Image Permanence Institute (IPI) of the Rochester Institute of Technology, to help us analyze our Old Stacks environmental conditions and to propose some possible solutions.

Over the course of 15 months, from October 2015 through December 2016, staff from IPI undertook three tasks: they placed data loggers—electronic sensors and recorders of temperature and relative humidity—throughout the Old Stacks; they put in place a regular cycle of downloading data into a data management and analysis system that they had developed, called eClimate Notebook, and trained us in its use; and they inspected the building and its heating and cooling systems. This inspection came during three onsite visits, each lasting two to three days, in October 2015, May 2016, and November/December 2016. Between visits, IPI

conducted regular phone calls with Library preservation staff and the Academy's Head of Facilities, and provided as-needed consultation services.

IPI's analysis resulted in some immediate and effective steps. After the site visit in May 2016, the Academy took steps to seal 18 windows in the Old Stacks against air and light, and to close an otherwise unnoticed passage that was adversely affecting humidity in the one area of the stacks. In both cases, two areas with high and widely fluctuating temperature and relative humidity saw readings lower and stabilize. The Academy also began, on a seasonal basis, to adjust temperature settings to reduce humidity in the stacks.

In December 2016, at the conclusion of the project, IPI provided the Academy with a comprehensive report on the environmental conditions in the Old Stacks based on their analysis of temperature and relative humidity data, and of the building and its heating and cooling systems.

The eClimate Notebook system proved crucial here. The system can represent data in a variety of ways, including graphically, to show daily, weekly, and seasonal variations, at different levels of detail. The system can display data from different parts of the building next to one another, so one can trace the sources of heat and humidity and see how they flow from space to space. Finally, IPI worked out "Preservation Metrics" that serve to condense complex data into simple reports. In the case of the New York Academy of Medicine's Old Stacks, we were chiefly interested in the "Natural Aging" metric, which measure the rate at which common library materials deteriorate due to conditions of temperature and humidity. IPI provides three ratings: At Risk, OK, and Good. Other metrics that we are interested in are "Mold Risk," which can readily happen above a combined threshold of temperature and humidity; "Mechanical Damage," which can occur when extremes of humidity cause water vapor to enter and leave a book's structure, expanding and shrinking its component parts; and finally "Metal Corrosion," due to high temperature or humidity—although less a concern for our collections.

The IPI report confirmed what we had suspected on the basis of working in the Old Stacks: in the summertime, temperature and relative humidity are too high and their fluctuation is too wide and rapid. The report's summary is worth quoting:

In summer, the high temperatures experienced in the spaces can accelerate the rate of chemical decay of collection materials. When combined with high relative humidity, this can lead to mold germination and increased pest activity. Materials take longer to equilibrate to changes in relative humidity, but when fluctuations do take effect, they can cause mechanical decay as materials expand and contract.

In wintertime conditions are somewhat better, although relative humidity is too low for the given temperature, and both temperature and humidity show wide fluctuations. In both summer and winter, there are wide divergences of conditions between different locations within the stacks, despite all the floors being in effect one large room with open access among them. In summary, data analysis showed that the collections in the Old Stacks are “At Risk” in three of the four preservation metrics: Natural Aging, Mechanical Damage, and Metal Corrosion; for the fourth, Mold Risk, half of the Old Stacks floors also had conditions that put the collections “At Risk.”

IPI provided a series of recommendations to improve the environmental conditions within the Old Stacks. They include adding new cooling and heating capacities to the existing system to better regulate the humidity; reducing or eliminating external air sources and instead recycling existing stack air; and providing a new air return system to even out the environmental conditions among all the floors. IPI recommends lowering the overall temperature in winter, to increase the humidity at this very dry time of the year, and expanding the use of season set points. In particular, summer stack temperatures should also be significantly lowered if possible. Achieving that last goal may be dependent on fulfilling one their major recommendations: the installation of a new heating and cooling unit for the stacks.

A series of recommendations addressed other environmental issues: shielding our stack lighting or changing it to LED to eliminate UV emissions; filling up a neglected construction hole in one wall; and exploring an Integrated Pest Management program to reduce the chemical load within the collection. IPI also suggested that we continue environmental monitoring with data loggers and the eClimate Notebook system, to remain aware of conditions and to provide a baseline for evaluating future efforts.

The Academy has started to implement some of these recommendations. We have already committed to continue environmental monitoring, and we have repaired the construction wall, and as noted, sealed up the windows within the Old Stacks. We have also committed to shielding,

at a minimum, those stack lights that are continually lit for safety reasons, and we hope to start a pilot project in Integrated Pest Management this summer. We are also committed to continue to use season set points in our current environmental control of the stacks.

Most of the rest of the recommendations will require major expenditures of funds, to be based on a careful cost analysis. As such they will be considered by the Academy Leadership Team, comprising the President, the Executive Vice President, the Senior Vice President for Finance and Administration, the Senior Vice President for Research, and the Vice President and Director of the Library.

The NEH grant has helped the Academy understand better the environmental conditions within its Old Stacks. Through the work of Academy staff and the Image Permanence Institute, the Academy has started to explore how best to extend the lifetime of these collections. We have already put in place some of IPI's recommendations and have seen quick improvements; other small but significant steps are now being undertaken. The major work is yet to come, in adding, updating, or replacing portions of the Old Stacks heating, cooling, and ventilating systems. To accomplish this work will take the combined efforts of the Library, Facilities, and the Academy Leadership. We are grateful to the NEH for giving us the insight into the problems as well as the outlines of some solutions. We now have an opportunity to make significant progress toward our ultimate goal of moving these collections from "At Risk" to "Good."